

CLAIMS:

- 1) A data packet implemented on a computer readable storage medium for transmission in a data network having one or
5 more layers, comprising:
 - a) a label stack, said label stack including one or more labels on the basis of which the data packet can be switched in the data network, each label having a switching significance in one or more of the layers
10 of the data network;
 - b) at least one layer identifier associated with at least one label in said label stack.
- 2) A data packet as defined in claim 1, wherein said layer
15 identifier allowing to distinguish between identical labels having switching significance in different layers of the data network.
- 3) A data packet as defined in claim 1, wherein said layer
20 identifier allowing to determine in which layer of the data network the at least one label has a switching significance.
- 4) A data packet as defined in claim 3, wherein said label
25 stack includes a layer identifier associated with each label in said label stack.
- 5) A data packet as defined in claim 4, including a key
30 associated with each layer identifier, said key capable to acquire different values, said key permitting to distinguish between layers having identical layer identifiers.

6) A data packet as defined in claim 5, wherein said key is a single bit flag.

7) A data packet as defined in claim 4, wherein said label
5 stack is of variable size allowing entities in the data network processing the data packet to push labels in said label stack and pop labels from said label stack.

8) A data packet as defined in claim 3, including an
10 address of an entity in the data network at a layer of the data network to which the data packet is destined.

9) A data packet as defined in claim 8, wherein the address is an IP address.

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10) A data packet as defined in claim 2, including a payload.

11) A data packet embedded in a signal for transmission
20 in a data network having one or more layers, comprising:
a) a label stack, said label stack including one or more labels on the basis of which the data packet can be switched in the data network, each label having a switching significance in one or more of the layers
25 of the data network;
b) at least one layer identifier associated with at least one label in said label stack.

12) A data packet as defined in claim 11 wherein, said
30 layer identifier allowing to distinguish between identical labels having switching significance in different layers of the data network.

13) A data packet as defined in claim 11, wherein said layer identifier allowing to determine in which layer of the data network the at least one label has a switching significance.

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14) A data packet as defined in claim 13, wherein said label stack includes a layer identifier associated with each label in said label stack.

10 15) A data packet as defined in claim 14, including a key associated with each layer identifier, said key capable to acquire different values, said key permitting to distinguish between layers having identical layer identifiers.

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16) A data packet as defined in claim 15, wherein said key is a single bit flag.

17) A data packet as defined in claim 13, wherein said
20 label stack is of variable size allowing entities in the data network processing the data packet to push labels in said label stack and pop labels from said label stack.

25 18) A data packet as defined in claim 13, including an address of an entity in the data network at a layer of the data network to which the data packet is destined.

19) A data packet as defined in claim 18, wherein the
30 address is an IP address.

20) A data packet as defined in claim 13, including a payload.

- 21) A network entity for use in a data network for label switching data packets, the data network having one or more layers and said network entity being intended to be associated to at least one of the network layers, said
5 network entity comprising:
- a) one or more input ports for receiving data packets to be label switched;
 - b) one or more output ports for releasing data packets from said network entity;
 - 10 c) a switching controller for switching a given data packet received at one of said input ports to one of said output ports on a basis of a label contained in the given data packet, said switching controller operative to ascertain if
15 the label contained in the given data packet has a switching significance in the layer of the data network to which the network entity is associated.
- 20 22) A network entity as defined in claim 21, wherein said switching controller ascertains if the label contained in the given data packet has a switching significance in a layer of the data network to which the network entity is associated on a basis of information contained in the
25 given data packet.
- 23) A network entity as defined in claim 22, wherein said switching controller completing the switching of the given data packet when said switching controller
30 ascertains that the label contained in the given data packet has a switching significance in the layer of the data network to which the network entity is associated.

24) A network entity as defined in claim 22, wherein said switching controller does not effect the switching of the given data packet when said switching controller ascertains that the label contained in the given data packet has no switching significance in the layer of the data network to which the network entity is associated.

25) A network entity as defined in claim 22, wherein the given data packet has a label stack, the label contained in the given data packet being in the label stack.

26) A network entity as defined in claim 25, wherein the information contained in the given data packet is in the label stack.

27) A network entity as defined in claim 26, wherein the information contained in the given data packet is a layer identifier.

28) A network entity as defined in claim 27, wherein the data packet contains a layer identifier associated with each label in the label stack.

29) A network entity as defined in claim 25, wherein said switching controller is capable to push a label in the label stack.

30) A network entity as defined in claim 29, wherein when pushing a certain label in the label stack said switching controller also inserting a layer identifier in the given data packet associated with the certain label.

31) A network entity as defined in claim 25, wherein said switching controller capable to pop a label from the label stack.

5 32) A network entity as defined in claim 31, wherein when popping a certain label from the label stack said switching controller also removes a layer identifier from the given data packet associated with the certain label.

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33) A network entity as defined in claim 23, wherein the given data packet includes a key associated with the layer identifier, said switching controller capable to distinguish between data packets containing identical
15 layer identifiers associated with respective labels at the same position in the respective label stacks of the data packets, on the basis of the keys associated with the layer identifiers.

20 34) A network entity as defined in claim 33, wherein said switching controller is capable to alter the key associated with a layer identifier in a data packet.

35) A network entity as defined in claim 34, wherein said
25 network entity is located at a logical boundary between a first network operator and a second network operator, wherein the second network operator is capable of terminating a first layer of the data network implemented by the first network operator by overwriting
30 a key in a data packet associated with the identifier of the first layer with a value of key corresponding to a layer implemented by of the second operator.

36) A network entity as defined in claim 34, wherein said network entity is located at a logical boundary between a first network operator and a second network operator, wherein said network entity is capable of overwriting a key in a data packet associated with an identifier of a first network layer managed by the first network operator with a value indicating that the layer identifier is not valid within a network layer managed by the second network operator.

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37) A network entity as defined in claim 21, wherein said network entity is an LSR.

15 38) A method for label switching data packets in a data network having one or more layers, said method comprising:

20 a) receiving a data packet at a location in the data network associated with at least one of the layers of the data network, the at least one layer being a first layer, the data packet containing at least one label;

 b) ascertaining if the label has a switching significance in the first layer;

25 c) switching the data packet at said location on the basis of the label if said ascertaining indicates that the label has a switching significance in the first layer.

30 39) A method as defined in claim 38, comprising precluding label switching the data packet when said ascertaining indicates that the label has no switching significance in the first layer.

40) A method as defined in claim 39, comprising declaring an error in connection with the data packet.

5 41) A method as defined in claim 38, wherein the data packet has a label stack comprising a plurality of labels, said switching being performed on a label in a topmost position in the label stack.

10 42) A method as defined in claim 41, wherein said ascertaining is performed on a basis of information contained in the data packet.

43) A method as defined in claim 42, wherein the
15 information contained in the data packet is a layer identifier associated with the label in the topmost position in the label stack.

44) A method as defined in claim 43, wherein said
20 ascertaining comprises comparing the layer identifier with an identifier of the first layer.

45) A method as defined in claim 41, comprising pushing a label in the label stack.

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46) A method as defined in claim 41, comprising popping a label from the label stack.

47) A method as defined in claim 43, wherein the data
30 packet includes a key associated with the layer identifier, the key allowing to distinguish between data packets containing identical layer identifiers associated with respective labels at the same position in the respective label stacks of the data packets, on

the basis of the keys associated with the layer identifiers.

48) A method for label switching data packets in a data network, said method comprising:

- a) receiving a data packet at a location in the data network managed by a certain network operator, the data packet containing at least one label;
- b) ascertaining if the label has a switching significance in an area of the network managed by the certain network operator;
- c) switching the data packet at said location on the basis of the label if said ascertaining indicates that the label has a switching significance in the area of the network managed by the certain network operator.

49) A network entity for use in a data network for label switching data packets, the data network having one or more layers and said network entity being intended to be associated to at least one of the network layers, said network entity comprising:

- a) input port means for receiving data packets to be label switched;
- b) output port means for releasing data packets from said network entity;
- c) means for switching a given data packet received at said input port means to said output port means on a basis of a label contained in the given data packet, said means for switching operative to ascertain if the label contained in the given data packet has a switching

significance in the layer of the data network to
which the network entity is associated.